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EXAMINER	
MONDT, JOHANNES P	

ART UNIT	PAPER NUMBER
3663	

DATE MAILED: 10/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/750,178	GRODZINS ET AL.	
	Examiner	Art Unit	
	Johannes P. Mondt	3663	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 August 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-63* is/are pending in the application.

4a) Of the above claim(s) *14-21,26-48,52-57 and 59-63* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13,22-25,49-51 and 58* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *(2)*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

This office action is in response to the Response filed 8/7/06. Comments on Remarks submitted with said Response are included below under "Response to Arguments", explaining why the rejections made in the previous office action are herewith made to stand (reproduced below).

Information Disclosure Statement

Applicant only partially responded to the statements made on Information Disclosure Statement filed 1/11/05. In this regard applicants' response in non-responsive. Applicant is kindly requested to comply with 37 C.F.R. 1.98 (a) (2) (i) and (ii) and 37 C.F.R. 1.98 (b) (5) by submitting a legible copy of each foreign patent and each publication listed on the Information Disclosure Statement complete with all information required according to 37 C.F.R. 1.98 (b) (5) (publisher, author(s), title, date of publication and place). Prior to submission these items are not acknowledged.

With regard to Information Disclosure Statement filed 8/7/06, the items are not in compliance with 37 C.F.R. 1.98 (b) (5).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. ***Claims 49-51 and 58*** are rejected under 35 U.S.C. 102(b) as being anticipated by Armistead (5,838,759) (see IDS).

Armistead teaches a method for creating an x-ray image of an object and detecting clandestine nuclear material associated with the object (title, abstract), the method comprising:

(a) illuminating the object with penetrating radiation (x-ray and neutron source: see col. 4, lines 14-31 and col. 5, lines 41-59);

(b) detecting emission (through detectors 18 and 28; loc.cit; see rejection of claim 1 over Armistead in view of Swift et al as included overleaf), including penetrating radiation emanating from the object (N.B.: said radiation includes radiation emanating from the object even in 18 and those of 24 placed behind the object, and certainly 24 placed on the same side as the source 14 to receive backscatter or radiation necessarily emanating from the body);

(c) producing an x-ray image of the object based on the detected emission (see element 28 in Figure 1);

(d) distinguishing between detected emission due to scattered penetrating radiation with the object and detected emission due to the clandestine nuclear (col. 3, lines 5-8) material (see col. 2, line 38 – col. 3, line 8).

On claims 50-51: distinguishing includes distinguishing detected emission due to fissile material (col. 3, lines 3-5) and hence also due to a dirty bomb should said dirty bomb have either uranium or plutonium (col. 3, lines 3-5); a dirty bomb of uranium or plutonium are instances of dirty bombs.

On claim 58: illuminating the object includes illuminating the object intermittently (col. 5, lines 22-26), and distinguishing includes distinguishing based on at least the

source- and detected signal timing (because distinguishing is conducted based on snapshots).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. ***Claims 1-3, 6-8, 13*** are rejected under 35 U.S.C. 103(a) as being unpatentable over Gozani et al (5,098,640) in view of Swift et al (5,903,623)..

Gozani et al teach an inspection system for inspecting an object, the inspection system comprising:

(a) an external source of penetrating radiation (fast neutrons and x-rays; see col. 14, lines 13-31, col. 12, lines 19-47, Figures 4, 5A, and 5B; please note lines 45-47 of col. 12 in particular, indicating the inclusion of an x-ray system in the same housing as the nuclear portion) for generating a beam and for irradiating the object, at least intermittently, the beam characterized at each instant of time by an instantaneous energy spectrum (namely: the energy spectrum of fast neutrons and x-rays) and an intensity that may be substantially zero (because induced nuclear reactions and x-ray imaging do not necessarily rely on a minimum flux of irradiation (note the claim language recites "may be", not must be or should be).

(b) at least one detector 178 (gamma ray detector: see col. 14, lines 45-62) configured to detect penetrating radiation (see Figure 5B), and to generate a detector signal (through detector 178 and the inherently present x-ray detector since otherwise no x-ray imaging can be performed (see final sentence of abstract)); and

(c) a processor (including 148 and 154: see Figure 4) configured as a detector signal discriminator (by analysis of the spectral content: see col. 13, lines 16-46 and col. 14, lines 63 – col. 15, lines 12) to receive the detector signal (inherent for any specific gamma ray detector and any specific x-ray detector), generate an x-ray image (from the x-ray ray detector), and generate output indicating whether the detector signal is triggered at least in part by an origin other than the penetrating radiation backscattered by the object (as otherwise the result of the interrogation by irradiation would indicate no gamma ray sources).

Gozani et al do not necessarily teach the limitation that the penetrating radiation detected by said detector is to include penetrating radiation backscattered by the object, but only because the positioning of the x-ray detector is not necessarily on the same side of the object 134 as the gamma ray detector 178, because if the latter were the case than 178 were a combined gamma ray and x-ray detector in essence, and the penetrating radiation inclusive of x-rays backscattered by the object would indeed be detected by said combined detector.

However, it would have been obvious to include said limitation in view of Swift et al, who, in a patent on x-ray inspection using penetrating radiation and hence analogous art with regard to what is missing in the teaching by Gozani et al, teach that x-ray

backscatter imaging offers unique inspection capabilities because inter alia (1) images can be taken even if the object is accessible only from one side, (2) backscatter images are indicative of a narrow slice because of rapid fall off with distance, thus providing more localized information than transmission images, and (3) alignment requirements for backscatter x-ray imaging is less demanding than for transmission x-ray imaging (see col. 4, l. 49 – col. 5, l. 5). *Motivation,* for inclusion of the teaching by Swift et al in the invention by Gozani et al in the above regard, stems directly from the listed advantages ad (1) – (3).

On claim 2: in the combined invention the source of penetrating photon (namely: x-ray) radiation has energy in "substantial excess of 200 keV" (see col. 10, lines 44-46). The range of the prior art is thus seen to substantially overlap the range as claimed (< 250 keV). Applicant is reminded that a *prima facie* case of obviousness typically exists when the ranges of a claimed composition overlap the ranges disclosed in the prior art or when the ranges of a claimed composition do not overlap but are close enough such that one skilled in the art would have expected them to have the same properties. In re Peterson, 65 USPQ2d 1379 (CA FC 2003).

On claim 3: the detector signal discriminator generates output based on source- and detected signal timing (inherent in any imaging through interrogation by irradiation is that the detected signal be related in time to the source that causes said detected signal) and induced spectral content (col. 14, line 63 – col. 13, line 12).

On claim 6: the detector signal discriminator generates an output when the origin includes gamma rays from the object (see gamma ray detector 178 in Gozani et al; see col. 14, lines 45-62).

On claim 7: in at least one embodiment the detector signal discriminator generates an output when the origin includes neutrons from the object; note that the additional neutron detectors are placed at the detector positions (col. col. 15, lines 59-64).

On claim 8: the at least one detector (detector 178 in Gozani et al; col. 14, lines 45-63) includes a segment having selective energy sensitivity because spectral lines (see col. 14, lines 64-68) can be identified by said detector.

On claim 13: the system by Gozani et al further comprises a current-integrating circuit 148/154 to receive the detector signal of the at least one detector (col. 15, lines 13-32); and a pulse-counting circuit configured to receive the detector signal of the at least one detector, and to operate during a period when the instantaneous energy intensity is substantially zero intermittently (col 15, lines 43-52), the latter limitation following from the circumstance that pulses are necessarily analyzed immediately after they have run their course.

2. ***Claims 1 and 22-24*** are rejected under 35 U.S.C. 103(a) as being unpatentable over Armistead (5,838,759) (see IDS) in view of Swift et al (5,903,623).

Armistead teaches an inspection system for inspecting an object (title, abstract), the inspection system comprising:

(a) an external source 14 (x-ray and neutron source: see col. 4, lines 14-31 and col. 5, lines 41-59) of penetrating radiation (x-rays and neutrons, loc.cit.) for generating a beam and for irradiating the object 12 (Figure 1);

(b) at least one detector 18 and 24 (col. 4, lines 45-50 and col. 5, lines 65-66) configured to detect penetrating radiation including but not limited to penetrating radiation scattered by said object, and to generate a detector signal; and

(c) a processor configured as a detector signal discriminator (28 and 34) (col. 5, lines 18-29 and lines 30-59, respectively) to

receive the detector signal,

generate an x-ray image (through 28) based on at least one detector signal (namely: from 18) (Figure 1), and

generate an output indicating whether or not the detector signal is triggered at least in part by an origin other than the penetrating radiation scattered by the object (see col. 15, lines 41-59)..

Armistead does not necessarily teach the limitation that the detection by said at least one detector is of radiation that is not merely "scattered", but is *backscattered*.

However, it would have been obvious to include said limitation in view of Swift et al, who, in a patent on x-ray inspection using penetrating radiation and hence analogous art with regard to what is missing in the teaching by Armistead, teach that x-ray backscatter imaging offers unique inspection capabilities because inter alia (1) images can be taken even if the object is accessible only from one side, (2) backscatter images are indicative of a narrow slice because of rapid fall off with distance, thus providing

more localized information than transmission images, and (3) alignment requirements for backscatter x-ray imaging is less demanding than for transmission x-ray imaging (see col. 4, l. 49 – col. 5, l. 5). *Motivation,* for inclusion of the teaching by Swift et al in the invention by Armistead in the above regard, stems directly from the listed advantages ad (1) – (3).

On claims 22-24: the source is capable of exciting characteristic emission lines of fissile elements including uranium and plutonium (col. 3, lines 1-5 in Armistead).

3. ***Claim 4*** is rejected under 35 U.S.C. 103(a) as being unpatentable over Gozani et al and Swift as applied to claim 3 above, and further in view of Armistead (5,838,759).

As detailed above, claim 3 is unpatentable over Gozani et al in view of Swift et al. Neither necessarily teach the further limitation defined by claim 4. However, it would have been obvious to include said further limitation in view of Armistead, who, in a patent on a photoneutron /x-ray imaging system for irradiation interrogation of objects, hence analogous art, teaches that the external source generates a beam that irradiates the object intermittently with x-rays and pulsed (hence also intermittent) "photo-neutrons" (by which inventor means: neutron-induced gamma ray spectroscopy, hence analogous in this respect; see col. 2, lines 38-44) (col. 2, lines 37-66) and thus has an intensity that is intermittently substantially zero.(namely in between on state for x-rays and in between pulses for the photoneutron beam), and the processor generates an output based on source- and detected-signal timing ((inherent in any imaging through

interrogation by irradiation is that the detected signal be related in time to the source that causes said detected signal).

4. ***Claim 5*** is rejected under 35 U.S.C. 103(a) as being unpatentable over Gozani et al and Swift et al as applied to claim 1 above, and further in view of Czirr (5,734,166).

As detailed above, claim 1 is unpatentable over either Armistead in view of Swift et al or Gozani et al in view of Swift et al, none, however, necessarily teaching the further limitation as defined by claim 5. However, it would have been obvious to include said further limitation in view of Czirr, who, in a patent on neutron detectors (title and abstract) teaches the inclusion of a beta radiation detector supplementing the gamma scintillator NaI type radiation detector also used by Gozani et al (see Gozani et al, col. 14, line 63 – col. 15, line 7) in order to distinguish gamma radiation emanating from the object from the background gammas radiation using coincidence. *Motivation* to include the teaching by Czirr in the invention by Gozani et al derives from the resulting discrimination between background gamma radiation and gamma radiation from the object.

5. ***Claims 9-11 and 25*** are rejected under 35 U.S.C. 103(a) as being unpatentable over Gozani et al and Swift et al as applied to claim 1 above, and further in view of Annis (4,809,312).

As detailed above, claim 1 is unpatentable over Gozani et al in view of Swift et al. Neither of these references necessarily teach the further limitations defined by claims 9-11.

However, it would have been obvious to include said further limitations in view of Annis, who, in a patent on producing tomographic images using x-rays, hence analogous art, teach the use of a chopper wheel 32 to temporarily gate the x-ray beam 31 from x-ray source 30 so as to create a pencil beam (hence meeting claim 25) thus increasing localization of the measurement (see col. 6, lines 8-27 and Figure 1), said localization being ample *motivation* for inclusion of the teaching by Annis in the combined invention by Gozani et al and Swift, because any positive signal is more useful when more localized, which is achieved through the pencil beam shape.

6. ***Claim 12*** is rejected under 35 U.S.C. 103(a) as being unpatentable over Gozani et al, Swift et al and Annis as applied to claim 9 above, and further in view of Resnick et al (6,215,842 B1).

As detailed above, claim 9 is unpatentable over Gozani et al in view of Swift et al and Annis, none necessarily teaching the further limitation defined by claim 12.

However, it would have been obvious to include said further limitation in view of Resnick et al, who, in the art relevant for the specific limitation defined by claim 12, namely teach the electronic gating of an x-ray source 20 (col. 4, lines 52-65) as an alternative to shutters, of which chopper wheels are special cases. Resnick et al thus shows the use of electronics to achieve gating of x-ray sources to be a well-known alternative and hence must be considered to be a design choice.

Motivation to include the teaching by Resnick et al at least follows from the inherent saving of power because, unlike in the case when the source is gated by a chopping wheel the power of the source is off between pulses of irradiation.

Response to Arguments

Applicant's arguments filed 8/7/06 have been fully considered but they are not persuasive.

On preliminary comments by applicants ad 1) and 2) (pages 12 and 13 of Remarks), they do not relate to the actual claim language. Furthermore, ad 1): none of the patentable, i.e., structural limitations of claim 1 require a set time lag of any kind (applicant admits there is time lag in any case), while no time lag is recited in method claim 49 either; while, ad 2): backscatter is merely included to an unspecified amount in the definition of the invention according to claim 1, while in Armistead detectors capable of detecting backscattered radiation are clearly included (see comments below, and see Figure 1, numeral 24 for instance): detectors are only shielded against scatter contributions so as to prevent the said signals to obscure other, more relevant signals (see col. 3, l. 40-43). Turning now to the specific arguments of traverse:

1. *On comments in traverse of the rejection of claims 49-51 and 58 as being anticipated by Armistead:*

Applicant's argument that the step of distinguishing between detected emission due to scattered penetration radiation with the object and detected emission due to the clandestine nuclear material (step (d), claim 49) is completely absent from Armistead is not persuasive:

According to Armistead, "special nuclear materials can be detected by fission neutrons produced by capture of the photoneutrons" (col. 3, l. 5-8 previously cited). Because said fission neutrons distinguish energetically they can indeed be detected as

fission neutrons, i.e., thus distinguished from backscattered photoneutrons. This is possible independent of the intensity of the latter, because detection and thus distinction, is based on the neutron energy. The intensity of the latter may well be small, and it is evidently of interest to keep said intensity small. However, any shielding only reduces the intensity thereof by absorption, i.e., a reduction with a factor independent upon the incoming intensity, which is an exponential law inherently incapable to reduce the intensity to zero. Please note that contraband distinguishes according to Armistead by the emission of fission neutrons *characteristics of the nuclear material* of interest. Any other portion of the neutron spectrum emanating from the target area whenever present is thus automatically distinguished not to be from said nuclear material. Applicant appears to argue (a) that backscatter is negligible, while also insisting that (b) Armistead apply shielding to prevent its detection. Allegations (a) and (b) are logically inconsistent because if (a) were true, then (b) would not be necessary. In fact, according to Armistead shielding only serves to reduce background radiation to levels not obscuring the signal of interest (col. 3, l. 41-43), *not to necessarily eliminate it*, and *it is said signal of interest that by its very detection as characteristic for fission neutrons distinguishes over the background including backscatter whether simultaneously detected or not*. That indeed backscatter *whenever occurring* is detectable follows at least from the location and orientation of the detector marked 24 (see office action, page 3, ad (b)).

Therefore, applicants' arguments in traverse of the rejections of claims 49-51 and 58 as anticipated by Armistead are not persuasive, examiner maintaining that Armistead teaches step (d).

2. *On comments in traverse of the rejections of claims 1 and 22-24 as being unpatentable over Armistead in view of Swift et al:*

Arguments in traverse are based on the allegation of failure of Armistead to teach a detector configured to detect radiation backscattered by the object, which in light of the foregoing paragraph of this action, and hence is unpersuasive for reasons given overleaf. Applicants argue that Swift teaching actual non-zero detection of backscattered radiation "is anathema to Armistead who teaches that detection of scattered incident radiation is to be avoided by shielding". However, as explained above in connexion with the rejections of claims 49-51 and 58, Armistead merely reduces backscatter *to avoid obscuring the signal of interest, not to necessarily eliminate* said backscatter signal (col. 3, l. 41-43). Therefore, combination with Swift, far from "anathema", complements Armistead by making use of backscatter in its own right, thus gaining an indicator of a narrow slice due to rapid fall off with distance while reducing alignment requirements, as explained in the previous office action on page 9.

Therefore, applicants' arguments in traverse of the rejections of claims 1 and 22-24 as unpatentable over Armistead in view of Swift et al are not found to be persuasive.

3. *On comments in traverse of the rejections of claims 1-11, 13 and 25 as being unpatentable under 35 USC 103(a) over Gozani et al in view of Swift et al (and*

for certain of said claims in further view of Armistead, Czirr, Annis and /or Resnick et al):

Applicants argue that "use of a single detector to detect scattered particles from the illuminated beam and other particles that arise spontaneously from within the interrogated object is nowhere taught or suggested by Gozani" (page 16 of Remarks). However, with reference to claim 1, in more than one way *this is not what is claimed.* The limitation of "a single detector" for "particles" does not feature anywhere, the language being extremely non-committing as to what (radiation, particles, and if so which type) is being detected by what and how many detectors, *while all that is needed for the combination as actually claimed is the rotation of detection units towards the fast neutron source for the combination of Gozani et al and Swift et al to be realized motivated by all three advantages by Swift et al.* As to the specific comment on claim 7, please note that one *or more* neutron detectors are added while they cannot be all exactly collinear with the incident beam. Finally, applicants' argument that the present invention "does not claim merely gated illumination and detection (as introduced in the additional limitation of claim 9), but teaches detection during the "off" period of the source" (page 16 of Remarks) pertains to a functional limitation enabled by the chopper wheel of the supplementary reference Annis. The combined invention defined by the references is thus seen to be capable to perform the intended use. Applicant is reminded in this regard intended use and other types of functional language must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is

capable of performing the intended use, then it meets the claim. In re Casey,152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963).

In conclusion, applicants' arguments in traverse of the rejections based on Gozani et al are not found persuasive.

For the above reasons the rejections made in the previous office action stand and are merely repeated without change.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Johannes P. Mondt whose telephone number is 571-272-1919. The examiner can normally be reached on 8:00 - 18:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack W. Keith can be reached on 571-272-6878. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JPM
October 14, 2006

Patent Examiner:
Johannes Mondt (Art Unit: 3663)